

The opinion in support of the decision being entered today was **not** written for publication and is **not** precedent of the Board.

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UNITED STATES PATENT AND TRADEMARK OFFICE

MAILED

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

AUG 22 2003

**PAT. & T.M. OFFICE
BOARD OF PATENT APPEALS
AND INTERFERENCES**

Ex parte SCOTT K. POZDER and THOMAS S. KOBAYASHI

Appeal No. 2003-1299
Application No. 09/443,443

ON BRIEF

Before KIMLIN, DELMENDO and PAWLIKOWSKI, **Administrative Patent Judges.**

PAWLIKOWSKI, **Administrative Patent Judge.**

DECISION ON APPEAL

This is an appeal under 35 U.S.C. 134 from the examiner's refusal to allow claims 1-6, 8-11, and 24-32. Claims 7 and 12-23 have been cancelled.

Claims 1, 5, 8, and 30 are representative of the subject matter on appeal and are set forth below:

1. A method of forming a semiconductor device, comprising:
forming a first interconnect level over a semiconductor substrate;
forming an uppermost interconnect level that includes an interconnect portion and a bond pad over the first interconnect level, wherein:
the interconnect portion contacts the first interconnect level by way of vias through an interlevel dielectric layer, and wherein all vias interconnecting the interconnect portion and the first interconnect level are positioned outside regions directly below the bond pad;
forming a passivation layer over the uppermost interconnect level;
removing portions of the passivation layer, wherein removing portions of the passivation layer exposes portions of the bond pad and forms a plurality of support structures overlying the uppermost surface of the bond pad; and
forming a conductive capping layer overlying the plurality of support structures, wherein the conductive capping layer electrically contacts the bond pad.

5. The method of claim 1, wherein the plurality of support structures are interconnected with unremoved portions of the passivation layer.

8. The method of claim 1, further comprising forming a barrier layer between the capping layer and the bond pad, wherein the barrier layer overlies the support structures and abuts exposed portions of the bond pad.

30. The method of claim 29, wherein the conductive film is further characterized as an aluminum film.

On page 6 of the brief, appellants group the claims as set forth therein. In accordance therewith, we consider claims 1, 5, 8, and 30 in this appeal.

Claims 1-5, 10, 24-27, 30, and 32 stand rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Freeman and Lien.

Claim 6 stands rejected under 35 U.S.C. § 103 as being unpatentable over Freeman and Lien, and further in view of Takiar.

Claims 8, 9, 28, 29, and 31 stand rejected under 35 U.S.C. § 103 over Freeman and Lien in view of White.

Claim 11 stands rejected under 35 U.S.C. § 103 as being unpatentable over Freeman and Lien in view of Hwang.

OPINION

I. The rejection of claims 1-5, 10, 24-27, 30 and 32 under 35 U.S.C. § 103 over the combination of Freeman and Lien

Beginning on page 6 of brief, appellants argue that the combination of Freeman and Lien fails to teach the removal of portions of a passivation layer to expose portions of a bond pad, and formation of a plurality of support structures overlying the bond pad surface. Appellants argue that both Freeman and Lien teach conventional patterning of the passivation layer in which a single large opening is formed over the bond pad. Appellants argue that the term "passivation layer" is well known in the field of semiconductor fabrication to refer to that dielectric or insulating layer overlying the uppermost interconnect layer that is used to provide mechanical protection to the underlying integrated circuit and a barrier that prevents impurities, including moisture, from attacking the integrated circuit.

In response, on page 7 of the answer, the examiner states that Freeman discloses plural openings in passivation layer 19 to expose bond pad 18. The examiner also states that it is not necessary that Freeman discloses the same advantages as the instant invention, but it is sufficient that the same materials are treated in the same manner. We understand the position of

the examiner to be that layer 19 shown in the figure of Freeman is a dielectric layer having vias 22 formed therein, which overlie metal layer 18. Hence, it appears that the examiner equates the first interconnect level of appellants' claim (layer 120 in appellants' figure 1) with layer 13 of Freeman, and equates the uppermost interconnected level (layer 133 in appellants' Figure 1) with Freeman's layer 18. Vias 22 in layer 19 are positioned over layer 18, which the examiner equates as bond pad. This bond pad of layer 18 overlies layer 14, which is another dielectric layer. The examiner equates layer 19 as the passivation layer that overlies metal layer 18.

We are mindful of appellants' discussion of the meaning of term "passivation layer". However, appellants' specification discloses that layer 136 is a "dielectric (passivation) layer". See page 9, line 3. The specification indicates that this dielectric layer 136 is formed of a nitrogen-containing compound or alternatively can include silicon oxide, silicon oxynitride, a hydrogen and carbon -containing silicon oxide, or the like. See page 9, lines 3-7 of the specification. Freeman indicates that the dielectric layer 19 can be of silicon oxide or other suitable materials such as oxynitride or borosilicate glass. See column 3, lines 55-58 of Freeman. Hence, the examiner's position that dielectric layer 19 serves as appellants' layer 136 is appropriate, especially in view of appellants' specification, as discussed herein.

Therefore, with respect to claims 1-4, 10, 24-27, and 32, we affirm the rejection.

With respect claim 5, beginning on page 9 of the brief, appellants argue that claim 5 requires that the plurality of support structures are interconnected with unremoved portions of the passivation layer. Appellants state that Freeman's

structure indicates that layer 19 is a free floating structure that is not connected to the unremoved portions of the corresponding dielectric layer. We agree for the following reasons.

On page 8 of answer, the examiner simply responds by stating that appellants have not provided a convincing argument that the term requires that the remaining portions of the dielectric to be connected. We find that on page 9, at lines 12-15 of appellants' specification, the specification indicates that the plurality of support structures 138 remain connected to portions of the dielectric layer 134 which have not been removed. In this light, we find that claim 5 requires that the support structures are interconnected with unremoved portions of the passivation layer. We therefore disagree with the examiner's statement made at the top of page 8 of the answer. In view of this, we reverse this rejection with respect to claim 5.

With respect to claim 30, because claim 30 depends upon claims 28/29, and because we reverse the rejection with respect to claims 28 and 29 (discussed, infra, in Section III of this decision), we reverse the rejection of claim 30.

In summary, with regard to this rejection, we affirm the rejection with respect to claims 1-4, 10, 24-27, and 32, but we reverse the rejection with respect to claims 5 and 30.

II. Rejection of claim 6 under 35 U.S.C. § 103 as being unpatentable over Freeman and Lien in view of Takiar

Because we have reverse the rejection of claim 5, and because claim 6 depends upon claim 5, we also reverse this rejection.

III. The Rejection of claims 8, 9, 28, 29, and 31 under 35 U.S.C. § 103 over Freeman and Lien in view of White

Beginning on page 10 of the brief, appellants argue that claim 8 requires forming a barrier layer between the capping layer and the bond pad, wherein the barrier layer overlies the support structures and abuts exposed portions of the bond pad.

Appellants argue that because Freeman suggests that each of its metal layers can be made of the same material, there is no need to incorporate an intermediate barrier film. Appellants state that doing so would only introduce additional processing steps in Freeman.

At the top of page 6 of the answer, the examiner's position is that White teaches forming a conductive pad with a capping layer with a barrier layer, and concludes that it would have been obvious to combine the teachings of Freeman, Lien, and White "to enable formation of the bond pad and capping layer of the combination to be performed". We find this explanation by the examiner is insufficient for a showing of obviousness. We note that where an obviousness determination is based on a combination of prior art references, there must be some "teaching, suggestion or incentive supporting the combination." In re Geiger, 815 F.2d 686, 688, 2 USPQ2d 1276, 1278 (Fed. Cir. 1987). "[T]he factual inquiry whether to combine references must be thorough and searching." McGinley v. Franklin Sports, Inc., 262 F.3d 1339, 1351-52, 60 USPQ2d 1001, 1008 (Fed. Cir.

2001). Thus, the burden is on the examiner to identify concrete evidence in the record to support his conclusion that it would have been obvious to modify the teachings of the cited references to achieve the claimed invention. In re Kotzab, 217 F.3d 1365, 1370, 55 USPQ2d 1313, 1316-17 (Fed. Cir. 2000). In the present case, the examiner has simply failed to meet this burden in view of the terse reasoning provided by the examiner, mentioned above. For example, the examiner does not explain why one of ordinary skill in the art would have been motivated to incorporate a barrier layer in the device of the combination of Freeman and Lien, in view of the teachings of White.

We therefore reverse this rejection.

IV. The rejection of claim 11 under 35 U.S.C. § 103 over Freeman and Lien in view of Hwang

Claim 11 is dependent upon claim 1. Claim 1 was rejected under 35 U.S.C. § 103 as being unpatentable over the combination of Freeman and Lien, and we affirmed the rejection with respect to claim 1. Claim 11 further requires that conductive capping layer includes a material selected from the group consisting of nickel and palladium. Appellants do not contest the rejection of claim 11 (i.e., appellants do not provide separate arguments for claim 11). We therefore affirm this rejection.

V. Conclusion

We affirm the rejection of claims 1-4, 10, 24-27, and 32 under 35 U.S.C. § 103 as being unpatentable over Freeman and Lien. However, we reverse this rejection with respect to claims 5 and 30.

Appeal No. 2003-1295
Application No. 09/443,443

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